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EXAMINER				
LEUNG, JENNIFER A				
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

09/725,165

Applicant(s)

RAMOS ET AL.

Examiner

JENNIFER A. LEUNG

Art Unit

1797

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 February 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 and 3-7 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1 and 3-7 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on February 17, 2009 has been entered.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

2. Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Owen et al. (US 3,821,103) in view of Perry's Chemical Engineers' Handbook (*Dust Separation*, Pages 17-12 to 17-13 and FIG. 17-22) and Zenz (*Fluidization, Solids Handling and Procession*, Chapter 12: Cyclone Design, pp. 812-815).

Owen et al. (see FIG. 1; column 3, line 65 to column 4, line 30; column 5, lines 19-35) discloses an apparatus comprising:

a primary cyclone **65** and a secondary cyclone **67** disposed in a separator vessel **75**, wherein a cyclone separator leg joins the lower end of the leg **69** of the secondary cyclone **67** and the leg **71** of the primary cyclone **65** to form a single primary and secondary cyclone leg complex where solids collected by both cyclones are combined (see FIG. 1), the termination of the cyclone separator leg being immersed in a fluidized bed of particles **73**.

Owen et al. is silent as to the cyclone separator leg terminating distally in an open, single leg termination that is devoid of movable sealing parts at all times. Although not specifically described by Owen et al., it appears from the illustration of FIG. 1 that the cyclone separator leg does, however, terminate distally with *some* sort of dip-leg sealing arrangement. The Examiner takes Official Notice that such illustration is commonly used in the art to suggest dip-leg sealing arrangements.

Perry's Chemical Engineers' Handbook teaches conventional dip-leg sealing arrangements for use in cyclone separators, wherein, as an alternative to a sealing arrangement with moveable sealing parts (see FIG. 17-22 (a)), it is known to use sealing arrangements comprising an open termination that is devoid of movable sealing parts at all times (see FIG. 17-22 (c)).

It would have been obvious for one of ordinary skill in the art at the time the invention was made to modify the cyclone separator leg in the apparatus of Owen et al. such that the leg terminated distally in an open, single leg termination that was devoid of movable sealing parts at all times, because such a leg termination would have been recognized as a well known sealing

arrangement for cyclones in the art, as evidenced by Perry's Chemical Engineers' Handbook. Furthermore, the substitution of known equivalent structures (i.e., the substitution of one known dipleg sealing arrangement for another known dipleg sealing arrangement) involves only ordinary skill in the art. *In re Fout* 213 USPQ 532 (CCPA 1982); *In re Susi* 169 USPQ 423 (CCPA 1971); *In re Siebentritt* 152 USPQ 618 (CCPA 1967); *In re Ruff* 118 USPQ 343 (CCPA 1958), and when the prior art that is altered by the mere substitution of one element for another known in the field, the combination must do more than yield a predictable result, *KSR International Co. v. Teleflex Inc.*, 82 USPQ2d 1385 (2007).

Owen et al. (see Figure I) further discloses that the leg **69** of the secondary cyclone **67** extends substantially straight and vertically aligned with a center axis of the secondary cyclone **67** to a junction thereof with the leg **71** of the primary cyclone **65**, the leg **71** of the primary cyclone **65** is inclined with respect to a center axis of said primary cyclone **65** to extend from said primary cyclone **65** to said junction, and said separator leg extends substantially straight and vertically aligned with the center axis of the secondary cyclone **67**, from the junction and along a portion of a length thereof. The connecting configuration of the legs **69** and **71** in Owen et al. is similar to the claimed configuration, except that configuration in Owen et al. is reversed (i.e., in Applicant's apparatus, the leg of the primary cyclone is straight and the leg of the secondary cyclone is inclined).

However, it would have been an obvious matter of design choice to a person of ordinary skill in the art at the time the invention was made to reverse the connecting configuration of the legs **69** and **71** in the modified apparatus of Owen et al., on the basis of suitability for the intended use and absent a showing of unexpected results thereof, because Applicant has not

disclosed that the connecting configuration of the primary cyclone leg to be straight and the secondary cyclone leg to be inclined (as opposed to the primary cyclone leg being inclined and the secondary cyclone leg being straight, as in Owen et al.) provides an advantage, is used for a particular purpose, or solves a stated problem. For example, it would have been obvious for one of ordinary skill in the art at the time the invention was made to configure the dipleg connections according to the claimed configuration, in order to have the diplegs avoid structures that are also located within the vessel. Furthermore, one of ordinary skill in the art would have expected Applicant's invention to perform equally well with the connecting configuration of the legs being reversed, because the ability of the legs to convey particles from the primary and secondary cyclones back to the fluidized bed of particles does not appear to be affected by whether a specific cyclone leg is straight or inclined.

The limitations of, "a separator vessel having a pressure in excess of those inside the primary and secondary cyclones," and "said fluidized bed of particles within the cyclone legs being located above the junction of the lower ends of the secondary and primary cyclone legs," add no further patentable weight to the apparatus claims, because the relative pressures and the specific level of particles within the cyclone legs are process limitations and will ultimately depend on the manner in which the claimed apparatus is intended to be operated. For instance, as is well known in the art of cyclone design, "[t]he extent to which the dipleg of a cyclone is filled with exiting solids depends on the pressure balance around the cyclone and it dipleg," (Zenz, page 813, under "Pressure Balance"). In addition, a claim containing a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus if the prior art apparatus teaches all

the structural limitations of the claim, *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987). Also, expressions relating the apparatus to contents thereof during an intended operation are of no significance in determining patentability of the apparatus claim, *Ex parte Thibault*, 164 USPQ 666, 667 (Bd. App. 1969), and the inclusion of a material or article worked upon by a structure being claimed does not impart patentability to the claims. *In re Young*, 75 F.2d 966, 25 USPQ 69 (CCPA 1935); *In re Otto*, 312 F.2d 937, 136 USPQ 458, 459 (CCPA 1963).

3. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Owen et al. (US 3,821,103) in view of Perry's Chemical Engineers' Handbook (*Dust Separation*. Pages 17-12 to 17-13 and FIG. 17-22) and Zenz (*Fluidization, Solids Handling and Proccession*. Chapter 12: Cyclone Design. pp. 812-815), as applied to claim 1 above, and further in view of Braun et al. (US 5,079,379).

Perry's Chemical Engineers' Handbook further teaches a sealing arrangement comprising a radius-curved, open, termination that is devoid of movable sealing parts at all times (see FIG. 17-22 (b)). Braun et al. further teaches the use of a radius-curved, open, termination that is devoid of movable sealing parts at all times (i.e., at the bottom of leg **23**; no movable sealing parts are mentioned; see FIG. 1), wherein the radius curved termination is disposed below the level of the fluidized bed of particles **10**, for sealing a cyclone separator **20**.

It would have been obvious for one of ordinary skill in the art at the time the invention was made to substitute a radius-curved, open, termination for the termination in the modified apparatus of Owen et al., because such a leg termination would have been recognized as a well known sealing arrangement for cyclones in the art, as evidenced by Perry's Chemical Engineers' Handbook and Braun et al., wherein such termination may be located below the level of the

fluidized bed, as taught by Braun et al. Furthermore, the substitution of known equivalent structures (i.e., the substitution of one known dipleg sealing arrangement for another known dipleg sealing arrangement) involves only ordinary skill in the art, and when the prior art that is altered by the mere substitution of one element for another known in the field, the combination must do more than yield a predictable result.

4. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Owen et al. (US 3,821,103) in view of Perry's Chemical Engineers' Handbook (*Dust Separation*. Pages 17-12 to 17-13 and FIG. 17-22), Zenz (*Fluidization, Solids Handling and Procession*. Chapter 12: Cyclone Design. pp. 812-815) and Braun et al. (US 5,079,379), as applied to claim 7 above, and further in view of Danielsen et al. (U.S. 4,996,028).

It appears, from the illustrations, that both Perry's (FIG. 17-22(b)) and Braun et al. (FIG. 1) teach radius curved terminations having a ratio of radius-to-diameter within the claimed range (based on a comparison with Applicant's FIG. 3). Perry's and Braun et al., however, do not expressly state the ratios for the radius curved terminations. Danielsen et al., however, teaches, "the radius of curvature of the tubular body portion **25** preferably is in the range of from about 1 1/2 times to about 2 1/2 times the diameter of the tubular body portion **25**." (column 3, lines 2-10; FIG. 1-2). It would have been obvious for one of ordinary skill in the art at the time the invention was made to configure the ratio of the radius-to-diameter for the radius-curved termination in the modified apparatus of Owen et al. within the instantly claimed range, if not already inherent therein, because maintaining a sufficient radius of curvature increases, under conditions of use, the stability of the dipleg solids level over that of diplegs having straight run tubular body portions, as taught by Danielson. (column 3, lines 2-10; FIG. 1-2).

5. Claims 4 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Owen et al. (US 3,821,103) in view of Perry's Chemical Engineers' Handbook (*Dust Separation*. Pages 17-12 to 17-13 and FIG. 17-22), Zenz (*Fluidization, Solids Handling and Proccession*. Chapter 12: Cyclone Design. pp. 812-815) and Braun et al. (US 5,079,379), as applied to claim 7 above, and further in view of Linden (US 2,341,671).

Regarding claim 4, the combination of Owen et al., Perry's, Zenz and Braun et al. fails to teach the radius curve termination being constructed from a succession of straight tube sections arranged in an arcuate array. Linden, however, teaches a cyclone separator wherein, as an alternative to smooth curvature construction (see FIG. 1), "[t]he production of the bent body of the separator can also be facilitated by making the individual sections not with curved but with straight axes, which are inclined one to the next as indicated in FIGs. 2 and 3." (see page 1, line 55 to page 2, line 4). Accordingly, it would have been obvious for one of ordinary skill in the art at the time the invention was made to construct the radius curve termination in the modified apparatus of Owen et al. from a succession of straight tube sections arranged in an arcuate array, in order to facilitate construction of the radius curved termination, as suggested by Linden.

Regarding claim 5, as modified above, the radius curve at the end of the cyclone leg in the modified apparatus of Owen et al. inherently directs the flow of descending mass of solids into a plane orthogonal to the ascending gaseous flow, by virtue of the total angle subtended by the radius curve.

6. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Owen et al. (US 3,821,103) in view of Perry's Chemical Engineers' Handbook (*Dust Separation*. Pages 17-12 to 17-13 and FIG. 17-22), Zenz (*Fluidization, Solids Handling and Proccession*. Chapter 12:

Cyclone Design. pp. 812-815), and Braun et al. (US 5,079,379), as applied to claim 7 above, and further in view of Jahnke et al. (US 4,220,623).

As shown in FIG. 1 of Owen et al., the junction of the leg **71** of the primary cyclone **65** and the leg **69** of the secondary cyclone **67** lies on the side opposite a distal end of the cyclone leg termination and higher than the distal end by a given length. Owen et al., however, is silent as to precise value of the length being shown, relative to the diameter of the leg **71** of the primary cyclone **65**. In any event, it would have been obvious for one of ordinary skill in the art at the time the invention was made to select an appropriate length for the distance between the junction and the distal end, relative to the diameter of the leg **71** of the primary cyclone **65**, in the modified apparatus of Owen et al., on the basis of suitability for the intended use and absent showing any unexpected results, because the precise length would have been considered a result effective variable by one having ordinary skill in the art, as evidenced by Jahnke et al. (see column 2, lines 6-19). Accordingly, one having ordinary skill in the art would have routinely optimized the length between the leg junction and the distal end to enable a sufficient accumulation of catalyst or head in the separator leg for preventing the underflow of vapors from the cyclone separator back into the fluidized bed, *In re Boesch*, 617 F.2d. 272, 205 USPQ 215 (CCPA 1980), and where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

Response to Arguments

7. Applicant's arguments filed February 17, 2009 have been fully considered but they are not persuasive.

Applicant (e.g., at page 4, last paragraph to page 5, first paragraph) has argued that the Examiner has employed improper hindsight in constructing the rejections. However, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the Applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

Applicant's arguments with respect to the Stine et al. reference (e.g., at page 5, last paragraph, to page 6, first paragraph; page 11, first paragraph, to page 13, second to last paragraph) have been fully considered. However, the arguments are now moot because the Stine et al. reference has been removed from the rejection.

Applicant (e.g., at page 6, first paragraph) has further argued that the "sheer number of references that the Examiner has had to rely upon" evidences that the claimed apparatus is novel and unobvious. However, reliance on a large number of references in a rejection does not, without more, weigh against the obviousness of the claimed invention. See *In re Gorman*, 933 F.2d 982, 18 USPQ2d 1885 (Fed. Cir. 1991).

Applicant (e.g., at page 6, first and second paragraph) has further argued that the Examiner has taken advantage of knowledge that is "beyond the level of ordinary skill in the art" in order to construct the rejections. However, it is unclear as to how the Examiner has done such, given that the rejections and reasoning are taken specifically from the teachings of the prior art, i.e., to Owens, Perry's Chemical Engineers' Handbook, Zenz, etc., and the knowledge generally available to those of ordinary skill in the art.

One of ordinary skill is charged with the knowledge of all prior art in the field of endeavor. *In re Carlson* 25 USPQ 2d 1207 (Fed. Cir. 1992); *In re Nilssen* 7 USPQ 2d 1500 (Fed. Cir. 1988); *Customer Accesories Inc. v. Jeffrey Allan Industries Inc.* 1 USPQ 2d 1196 (Fed. Cir. 1986); *Kimberly Clark Corp. v. Johnson & Johnson* 223 USPQ 603, 614 (Fed. Cir. 1984). The cited prior art is indicative of the level of ordinary skill. *Litton Industrial Products Inc. v. Solid State Systems Corp.* 225 USPQ 34 (Fed. Cir. 1985).

Applicant (e.g., at page 10, second to fourth paragraphs; also, page 16, first paragraph) has further argued that although the specification makes no mention of dipleg angles or problems with dipleg angles, the claimed dipleg angles are in fact critical to the invention. Applicant also states that the dipleg angles were selected “due to the negative results obtained in the patent application P19603898”, but this reasoning was never stated in the specification. Applicant also points to a previous response (dated April 2008) where similar arguments were presented. Applicant further states that Figure 2 is evidence showing such dipleg angles to be critical.

The Examiner respectfully disagrees. It is noted that the Attorney’s arguments have not been supported by factual evidence, as presented in an affidavit or declaration. See MPEP 716.01(c). Absent factual evidence, the Examiner maintains that the claimed configuration of dipleg angles would have been an obvious matter of design choice to a person of ordinary skill in the art, and one of ordinary skill in the art would have expected Applicant’s invention to perform equally well with the connecting configuration of the legs being reversed, because the ability of the legs to convey particles from the primary and secondary cyclones back to the fluidized bed of particles does not appear to be affected by whether a specific cyclone leg is straight or inclined relative to the other. As an example, one of ordinary skill in the art would have been motivated

to configure the dipleg angles according to the claimed configuration, in order to have the dipleg structure avoid other structures located within the vessel.

Applicant (e.g., at page 9, last paragraph, to page 10, first paragraph; page 14, last paragraph) has further argued that Owen “does not teach anything on the structural limitations of the leg junction. Actually it never recites junction of legs. There is only the figure which the Examiner uses as a base to generate several of his own conclusions as to the way it allegedly works.” (citation from page 14, last paragraph). This argument is not found persuasive. The Examiner maintains that the Owen’s figure very clearly shows the junction of the primary and second cyclone diplegs **71** and **69**. Drawings and pictures can anticipate claims if they clearly show the structure which is claimed. Also, when the reference is a utility patent, it does not matter that the feature shown is unexplained in the specification. The drawings must be evaluated for what they reasonably disclose and suggest to one of ordinary skill in the art. See MPEP 2125.

Applicant (at page 14, last paragraph) has further argued that the catalyst level in the cyclone legs must be considered a structural limitation. Again, the Examiner respectfully disagrees. The catalyst level is considered a functional limitation that does not impart further patentable weight to the apparatus claims. Please refer to MPEP 2114 and 2115 for the discussion of functional language as it relates to apparatus claims. Variables such as pressure level, flow rates, pressure differentials, etc. are also considered functional limitation (see Applicant’s arguments, e.g., at page 15, last paragraph).

Applicant’s arguments with respect to the prior art to Luckenbach (e.g., at page 17, second paragraph, to page 18, first paragraph) have been fully considered. The arguments,

however, are now moot, because Luckenbach has been removed from the rejection.

Applicant (e.g., at page 17, first paragraph) has further argued that Danielson's use of moveable sealing parts teaches away from the claimed invention. However, Applicant's argument is not found persuasive, because the Danielson reference has merely been relied upon for its teaching of a suitable ratio of radius to diameter. As noted above, it would have been obvious for one of ordinary skill in the art at the time the invention was made to select the claimed ratio of radius to diameter in the modified apparatus of Owen et al., if not already inherent therein, because maintaining a sufficient radius of curvature increases, under conditions of use, the stability of the dipleg solids level over that of diplegs having straight run tubular body portions, as taught by Danielson. (column 3, lines 2-10; FIG. 1-2).

Applicant (e.g., at page 18, last paragraph) has further argued that Jahnke teaches away from the claimed invention. However, the Jahnke reference (at column 2, lines 6-19) was merely relied upon for its teaching that the precise leg length would have been considered a result effective variable by one having ordinary skill in the art. With this teaching, one having ordinary skill in the art would have routinely optimized the length between the leg junction and the distal end to obtain a sufficient accumulation of catalyst in the separator leg for preventing the underflow of vapors from the cyclone separator back into the fluidized bed, and where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have

suggested to those of ordinary skill in the art.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JENNIFER A. LEUNG whose telephone number is (571) 272-1449. The examiner can normally be reached on 9:30 am - 5:30 pm Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Walter D. Griffin can be reached on (571) 272-1447. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jennifer A. Leung/
Primary Examiner, Art Unit 1797